

Single-channel, Erbium-doped Fiber Amplifiers (EDFAs)

WRA-110, WRA-113, WRA-116, WRA-119



Key Features

- Protocol and data-rate independent, including 10 Gbps /OC-192 applications
- Easily configurable as a booster or pre/inline C-band amplifier
- Four variants WRA-110, WRA-113, WRA-116, WRA-119 to match specific application requirements
- Constant signal gain mode configurable up to 13 dB (WRA-110) and up to 26 dB (WRA-119)
- Constant total output power mode configurable up to 10 dBm (WRA-110) and up to 19 dBm (WRA-119)
- Low power consumption and noise figure

Applications

- Booster or pre/inline amplifier
- Access and metro optical networks
- Point-to-point applications

Compliance

- Telcordia NEBS Level 3
- FDA Class 1M laser device
- FCC Class A device
- UL 60950-1 First Edition
- CAN/CSA C22.2 No. 60950 01
- CE
- IEC 60825-2
- RoHS 5/6

The WaveReady™ WRA-1xx series are user-configurable, single-channel optical amplifiers that provide simple and economical C-band optical amplification for single-channel applications in a flexible and ready-to-use package. These erbium-doped fiber amplifiers (EDFAs) are network-ready and easily configured as a booster or as pre/inline amplifier.

The modules work by default in constant signal-gain mode, but can be configured to constant total output-power mode. Its ease-of-use and performance make the WRA-1xx series the ideal solution for access and metro optical networks.

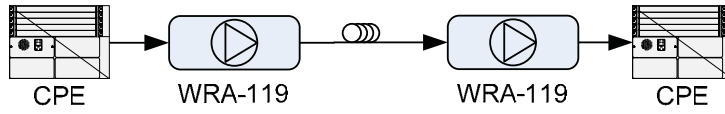
Front-panel light emitting diodes (LEDs) indicate module status, while integrated electronics provide alarm and control functionality.

Deployed with a WaveReady™ communications module (COM200), these units can be managed and configured remotely through TL1, SNMP or by using the WaveReady™ Node Manager. Local and remote management are done through an RS-232 or Ethernet port on the communications module.

The module is installed in a WaveReady 3500F or 3100 shelf mounted in 19- or 23-inch telecommunications racks.

2

Amplification for Extended Reach and Pre-amp Application



Minimum Power	Total Power Budget	Maximum Rx Distance
-30 dBm	49 dB	200 km

Figure 1: Power mask with noise figures¹ for WRA-110

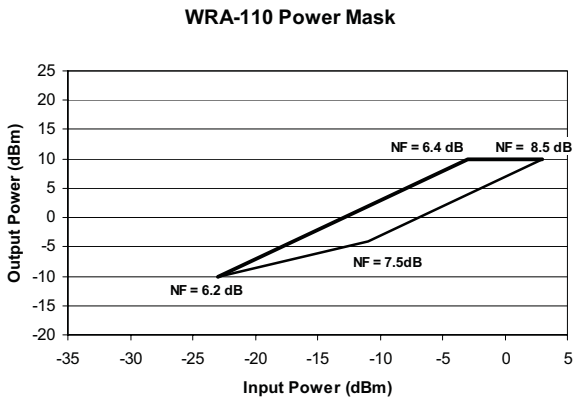


Figure 2: Power mask with noise figures for WRA-113

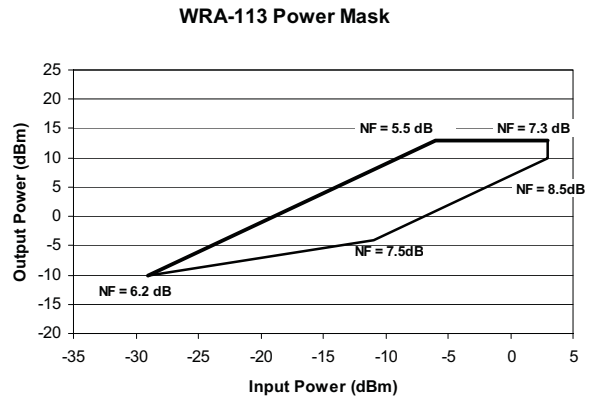


Figure 3: Power mask with noise figures for WRA-116

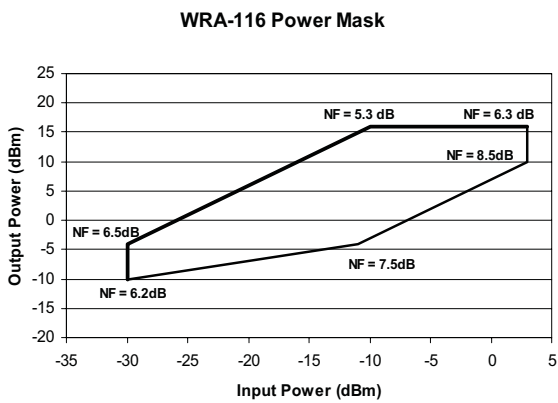
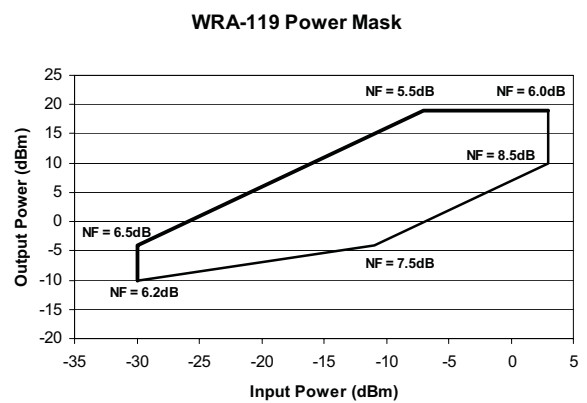


Figure 4: Power mask with noise figures for WRA-119



1. Noise figures are maximum, EOL values.

3

Optical Performance¹

Parameter	Minimum	Typical	Maximum
Operating wavelength range	1530 nm	-	1563 nm
Input power range			
WRA-110	-23 dBm	-	+3 dBm
WRA-113	-29 dBm	-	+3 dBm
WRA-116	-30 dBm	-	+3 dBm
WRA-119	-30 dBm	-	+3 dBm
Total output power (User configurable in constant Pout mode; 0.1dB set resolution)			
WRA-110	-10 dBm	-	+10 dBm
WRA-113	-10 dBm	-	+13 dBm
WRA-116	-10 dBm	-	+16 dBm
WRA-119	-10 dBm	-	+19 dBm
Input LOS threshold configurable range (User configurable; 1.0 dB set resolution)	-38 dBm	-	0 dBm
Power measurement accuracy (all detectors)			
$P \geq -29$ dBm	-0.7 dB	-	+0.7 dB
$-29 < P \leq -38$ dBm	-1.5 dB	-	+1.5 dB
Gain (User settable in constant gain mode. 0.1dB set resolution)	7 dB	-	26 dB
WRA-110	7 dB	-	13 dB
WRA-113	7 dB	-	19 dB
WRA-116	7 dB	-	26 dB
WRA-119	7 dB	-	26 dB
Polarization dependent gain	-	-	0.3 dB
Gain accuracy (Relative to gain target, in constant gain mode)	-1.25 dB	-	+1.25 dB
Gain stability (Peak-to-peak, in constant gain mode)	-0.1 dB	-	0.1 dB
Noise figures		see Figure 1,2,3, and 4	
Polarization mode dispersion	-	-	0.5 ps
Remnant 980 to output	-	-	-30 dBm
Return loss	-40 dB	-	-

1. Unless otherwise stated, all specifications are end-of-life, across all temperature and input conditions.

Electrical Specifications¹

Parameter	Minimum	Typical	Maximum
DC supply voltage	-	-48 V	-
Power dissipation	-	12 W	17 W
Alarm relay signals	Dry contact major and minor alarms. Relay open under normal operation. Relay closed when power is off.		

1. Electrical specifications assume installation in a WaveReady 3500F or 3100 shelf (DMS-3500FSE03 or DMS-3100DC004).

4

Physical Specifications

Parameter	Typical
Size (H x W x D)	6.8 x 1.0 x 8.8 inches (17.27 x 2.54 x 22.35 cm)
Weight (approximate)	1.6 lbs (0.73 kg)

Environmental Specifications

Parameter	Minimum	Typical	Maximum
Normal operating temperature	0° C	-	40° C
Extended operating temperature	-5° C	-	55° C
Storage temperature	-40° C	-	85° C
Relative humidity (non-condensing)	5 %	-	90 %

Interface Specifications

Parameter	Specification
Optical	LC/UPC SMF
Craft	Requires WaveReady 3100 or 3500F series shelf and a WaveReady COM200 communications module. Craft access through RS-232/DB9 connector on front panel of COM200 module.
TL1/SNMP	Requires WaveReady 3500F or 3100 series shelf and a WaveReady COM200 communications module. TL1/SNMP interfaces via the 10/100Base-T Ethernet/RJ45 connector on the front panel of a COM200.
Front panel	Five LEDs: CARD (power); MAJ/CRIT (major/critical alarm); MIN (minor alarm); TX/RX (port status), Laser On

Ordering Information

For more information on this or other products and their availability, please contact your local JDSU account manager or JDSU directly at 1-800-498-JDSU (5378) in North America and +800-5378-JDSU worldwide or via e-mail at customer.service@jdsu.com.

Sample: WRA-217

Product Code	Description
WRA-110	Single-channel EDFA, 10 dBm output
WRA-113	Single-channel EDFA, 13 dBm output
WRA-116	Single-channel EDFA, 16 dBm output
WRA-119	Single-channel EDFA, 19 dBm output

Associated Parts

Product Code	Description
DMS-3100DC004	WR3100 1U Shelf
DMS-3500FSE03	WR3500F Shelf
COM-200ET003Y	COM200 Communication module